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EXECUTIVE SUMMARY OF THE
NATIONAL COMMUNICATION OF

# AUSTRIA

submitted under Articles 4 and 12 of the
United Nations Framework Convention on Climate Change

In accordance with decision 9/2 of the Intergovernmental Negotiating Committee of the Framework Convention on Climate Change (INC/FCCC), the interim secretariat is to make available, in the official languages of the United Nations, the executive summaries of the national communications submitted by Annex I Parties.

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## INTRODUCTION

1. Within the scope of the United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992, 158 countries, including Austria, signed the Framework Convention on Climate Change. The aim of the Convention is to achieve a stabilization of greenhouse gas concentrations in the atmosphere in order to prevent dangerous interference with the climate system caused by human activities. Parties to the Convention are obliged, inter alia, to provide regularly emission inventories of greenhouse gases and plans of national measures for their reduction, and to promote the transfer of information and technology. An additional obligation exists for industrialized countries to report on measures, which will reduce greenhouse gas emissions to 1990 levels by the end of this decade. There is, however, no concrete obligation in regard to the realization of this reduction. Further, the industrialized countries are obliged to provide financial assistance for the developing countries to help them in achieving the objectives of the Convention.

2. Austria, as the 58th country, ratified the Framework Convention on Climate Change on 28 February 1994; the Convention entered into force on 29 May 1994.

3. Bearing in mind the precautionary principle Austria has laid down as a national target a 20 per cent reduction of carbon dioxide ($CO_2$) emissions until 2005 (based on the emissions of 1988) in the Energy Reports 1990 and 1993 of the Austrian Federal Government. This amounts to 44.3 Mt $CO_2$ in 2005 considering pyrogenic and process related $CO_2$ emissions. At present, the implementation of measures for achieving the so-called Toronto target is pursued.

4. This document is Austria's first national communication, by which Austria is complying with the obligation to communicate information to the secretariat of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC) according to Article 4.2 and Article 12 of the Convention. This national communication has to be submitted to the secretariat by 21 September 1994.

## THE ESSENTIAL ASPECTS OF AUSTRIA'S STRATEGY

5. Austria's strategy provides for preference to be given in principle to measures which reduce the use of energy and take effect essentially in the area of ultimate energy consumption, as opposed to measures which induce a shift in the fuel mix. Measures orientated towards ultimate energy consumption are to take effect primarily in the sectors of small private consumption as well as in the areas of room heating, water heaters and traffic.

6. On the resources side, the priority classification specific to sources of energy results primarily from the $CO_2$ emission factors of primary energy forms. The other climate-relevant emissions will have to be taken into account accordingly. In any case clear preference is to be given by approximation to $CO_2$-neutral primary sources of energy over non-$CO_2$ neutral sources of energy.

7. At the beginning of the nineties two committees were set up at the Austrian Federal Ministry of Environment, Youth and Family Affairs in order to develop effective strategies for climate protection. These were: the National $CO_2$ Commission (Austrian $CO_2$ Commission - ACC) and the Interministerial Committee to Coordinate Measures to Protect Global Climate (IMC Climate).

8. The brief of the national $CO_2$ Commission is to determine scientific and technological potentials, to recommend measures and strategies for achieving the Toronto target and to analyse instruments at expert level. In addition it also looks at ways of reducing emissions of other greenhouse gases and advises the Austrian Federal Government in all matters of climate protection.

9. The work of the $CO_2$ Commission forms the specialist basis for the activities of IMC Climate. Represented on this administrative committee are, among others, all the ministries concerned by the matter. Taking into account the catalogue of measures listed in the 1993 Energy Report, which contains largely $CO_2$-reducing measures, IMC Climate draws up detailed programmes for a comprehensive national strategy for reducing greenhouse gas emissions. The Committee reports to the council of ministers at regular intervals.

## WHERE DOES AUSTRIA STAND TODAY - WHAT HAS BEEN ACHIEVED AND WHAT REMAINS TO BE DONE?

10. The Austrian Government is actively engaged in developing and pursuing an efficient policy to reduce the national $CO_2$ emissions by 20 per cent on the basis of 1988 by the year 2005. The Interministerial Committee to Coordinate Measures to Protect Global Climate (IMC Climate) has elaborated a detailed and comprehensive catalogue of measures for reducing greenhouse gas emissions in order to support the Austrian Government in its efforts. On the basis of these measures, it is being anticipated that the reduction measures already under realization could stabilize Austria's $CO_2$ emissions at the 1990 level by the time period around 2000 to 2005.

11. The reduction measures to be implemented during the next legislative period (1994-1998) possess, according to preliminary evaluations, sufficient reduction potentials to reduce the level of emissions well below the stabilization target. However, the Austrian Government is fully aware that it has to increase its efforts to ensure further reductions.

Moreover, it recognizes that any attempt to reduce greenhouse gas emissions requires a long time before it produces a significant effect. Thus, even if all the necessary governmental decisions have been taken prior to 2005, it may take several years before it will be possible to reach the Toronto target.

## EMISSION INVENTORY FOR AUSTRIA

12. In Austria annual emission inventories for ozone precursor substances such as nitrogen dioxide ($NO_x$), carbon monoxide (CO), volatile organic compounds with the exception of methane (NMVOC) and for the greenhouse gases carbon dioxide ($CO_2$), methane ($CH_4$) and nitrous oxide ($N_2O$) because of their supraregional significance and significance in terms of quantity have been drawn up. These emission inventories are subdivided according to the sectors power and heating plants, industry, small consumers and motor vehicle traffic as well as the fuels oil, natural gas and coal.

13. In Austria emission inventories go as far back as 1980 for $NO_x$, NMVOC and CO and 1955 for $CO_2$. No emission trends over time can be given for $CH_4$ and $N_2O$ since comprehensive emission inventories for these greenhouse gases have only been compiled since 1990.

14. Table 1 lists Austria's emissions for the air pollutants $CO_2$, $CH_4$, $N_2O$, $NO_x$, NMVOC and CO for 1990. Emissions were determined according to the IPCC method. Pyrogenic as well as process-related emissions have been taken into account.

Table 1: Austrian greenhouse gas and air pollutant emissions for 1990 (in 1,000 metric tons; $CO_2$ in $10^6$ metric tons), determined in accordance with the IPCC method.

| $CO_2$ | $CH_4$ | $N_2O$ | $NO_x$ | NMVOC | CO |
|---|---|---|---|---|---|
| 59.2 | 602.8 | 4.1 | 225.5 | 415.4 | 1,682.5 |

Emissions from bunker fuels were not taken into account.

## PROJECTIONS OF GREENHOUSE GAS EMISSIONS AND REDUCTION POTENTIALS FOR AUSTRIA

15. With respect to $CO_2$, the reduction target committed to by Austria, in agreement with the recommendations of the 1988 Toronto Conference, is a 20 per cent reduction in $CO_2$ emissions by 2005 based on the emissions in 1988.

16. Five $CO_2$ emission scenarios have been prepared for Austria. In view of the secondary importance of the process related emissions, in relation to the overall emissions, presently and in future, and to facilitate comparison of different scenarios, the five scenarios focus only on pyrogenic emissions to generate a Toronto target that only accounts for pyrogenic $CO_2$ emissions, that is, 42.4 Mt $CO_2$/year in 2005. 1/

17. Three of the five scenarios -- a reference scenario (Ref), a stabilization scenario (Stab), and a reduction scenario (Red) -- have been prepared by the Austrian Institute of Economic Research (IER) on behalf of Austria's Federal Ministry of Economic Affairs (FMEA). The time horizon of these scenarios is 2005. The other two scenarios, an additional reference scenario (FEA '92) with a time horizon till the year 2005 and an additional reduction scenario (NEnvP) with a time horizon till the year 2025, have been prepared by Austria's Federal Environmental Agency (FEA) and on behalf of Austria's Federal Ministry of Environment, Youth and Family Affairs for its National Environmental Plan (NEnvP), respectively. The various scenarios are illustrated in Figure 1.1 of the communication, and may be characterized in the following simplified way.

18. The IER scenarios as well as the FEA '92 scenario originate from the same (IER) energy statistics, which was slightly updated for the more recent IER scenarios. 2/ Therefore, IER's reference scenario (Ref) and FEA's reference scenario (FEA '92) are very similar. The main assumptions behind this scenario, inter alia, are a mean annual economic growth between 2.5 and 3.0 per cent, constant real energy prices domestically, and ongoing efforts to optimize the use of energy as well as to promote renewable and environmentally more friendly energy sources.

- On the basis of the Ref scenario, it is anticipated that Austria is going to emit about 63.7 and 66.6 Mt $CO_2$ in the years 2000 and 2005. This corresponds to increases of 10 and 15 per cent, respectively, relative to 1990 (57.8 Mt $CO_2$ according to IER).

- The mean annual energy and carbon intensities that underlie the Ref scenario are about -1.5 and -0.3 per cent per year (1990-2000 annual growth rates), or -1.4 and -0.3 per year (1990-2005 annual growth rates), respectively.

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1/ So far, only the process related emissions of Austria's cement industry have been taken into account. They contribute and are expected to continue contributing to Austria's overall emissions by about 2.1 Mt $CO_2$/year, i.e., {42.4 + (2.1 * 0.8)} Mt $CO_2$/year = 44.1 Mt $CO_2$/year.

2/ The demographic data that underlie the updated energy statistics, however, do not take into consideration potential effects such as Austria's recent decision to join the European Union.

19. Both the IER stabilization (Stab) and the IER reduction scenarios (Red) describe a situation in Austria, in which $CO_2$ emission reductions would be realized on the basis of additional savings in energy and structural changes. Otherwise, the overall economic conditions are similar to those assumed for the Ref scenario.

20. The reduction scenario assumes an increase in energy efficiency, which will generate energy saving potentials that are generally considered to be economically feasible, while the stabilization scenario utilizes the energy saving potential only by about one third. The energy saving potentials reported by the FMEA were used as input values for the scenario calculations.

- The Stab scenario aims at reducing Austria's $CO_2$ emissions down to the level of 1990, that is 57.8 Mt $CO_2$/year, by 2005. This effort requires an energy intensity and a carbon intensity of about -2.1 and -0.5 per cent per year, respectively (1990-2005 annual growth rates).

- On the basis of the Red scenario, it appears that there may be a possibility for Austria to reduce its emissions down to about 47.8 and 42.8 Mt $CO_2$/year by the years 2000 and 2005. This corresponds to decreases in the order of 17 and 26 per cent, respectively, relative to 1990.

- The mean annual energy and carbon intensities are about -3.8 and -0.7 per cent per year (1990-2000 annual growth rates), or -3.8 and -0.8 per cent per year (1990-2005 annual growth rates), if the Red scenario is to be realized until 2000 or 2005, respectively.

21. The NEnvP reduction scenario, finally, also employs IER's most recent energy statistics, but follows a bottom up approach. It builds on generous assumptions with regard to the development of the required energy services. For instance, from 1990 to 2005 Austria's population is allowed to increase by 15 per cent, residential area by 10 per cent, or mobility (in kilometers per capita) by 44 per cent. The scenario also builds on generous approximations with regard to the development of energy application and transformation technologies; only technological options that are within realistic reach, are considered.

- On the basis of the NEnvP scenario, Austria's $CO_2$ emissions are reduced down to about 46.2 and 41.2 Mt $CO_2$/year by the years 2000 and 2005. This corresponds to decreases in the order of 18 and 27 per cent, respectively, relative to 1990 (56.4 Mt $CO_2$ in this scenario).

- The mean annual energy and carbon intensities are about -1.9 and -1.2 per cent per year (1990-2000 annual growth rates), or -2.0 and -1.3 per cent per year (1990-2005 annual growth rates), if the NEnvP scenario is to be realized until 2000 or 2005, respectively.

22. Temporary removal of $CO_2$ from the atmosphere, on the other hand, is confined to a few measures that are not yet implemented. The (1990-2005) annual removal rate as the result of afforestation (ca. 2.5 Mt $CO_2$/year), changes in the forest management (ca. 4.1 Mt $CO_2$/year), and doubling the use of wood products with a long life-span (ca. 0.2 Mt $CO_2$/year) would be about 6.8 Mt $CO_2$/year. This value, however, constitutes rather a potential removal rate and therefore an upper limit.

23. With respect to $CH_4$ and $N_2O$ the most recent emission projections for 2000 have been developed by Orthofer and Hackl, 1993, Steinlechner et. al., 1994 and Orthofer and Knoflacher, 1994. In 2000 about 600,000 t $CH_4$ and about 4,200 t $N_2O$ will be emitted accordingly.

## POLICIES AND MEASURES OF AUSTRIA

24. The Interministerial Committee to Coordinate Measures to Protect Global Climate (IMC Climate) has -- inter alia, based on the Energy Concept 1993 -- elaborated a detailed catalogue of measures to support Austria's efforts in reducing its greenhouse gas emissions. This catalogue contains measures, which are already being realized, which are planned to be taken within the next legislative period (1994-1998), or which are in a conceptual stage and will eventually require more time to be realized and to become effective.

25. The measures under realization are summarized in Table 4.1 in Chapter 4.2 of the communication. Most of them aim at reducing $CO_2$ emissions, although some of them refer also to other greenhouse gases. They are grouped according to energy supply and transformation, traffic, industry, small consumers, agriculture, and cross-sectorial measures.

26. Only for part of the measures has the reduction effect in 2000 been estimated. For these measures the combined reduction effect in 2000 amounts to approximately 4.3-5.1 Mt $CO_2$/year as a first and crude approximation reflecting the present state of knowledge. Considering the projected increase of Austria's $CO_2$ emissions from 57.8 Mt $CO_2$ in 1990 to 63.7 Mt $CO_2$ in 2000 according to the IER reference scenario (Ref), the measures quantified so far may hardly be sufficient to counterbalance the increase since 1990.

27. Considering also those measures in Table 4.1 of the communication, which have or could not yet been quantified, it might be possible for Austria, according to preliminary estimates, to stabilize its $CO_2$ emissions by the time period around 2000 to 2005. It must be kept in mind, however, that the IER reference scenario already utilizes a specified set of assumptions and measures aimed at optimizing the use of energy. The extent, to which the effect of current measures will meet or exceed the reduction of $CO_2$ emissions projected in the IER reference scenario, needs still to be analyzed.

28. Combining the current measures with additional measures, which are planned to be enacted during the next legislative period, a considerable number of additional possibilities to reduce Austria's $CO_2$ emissions is given. It is the entire set of measures, that is, the interaction of measures among each other, which contain a $CO_2$ reduction potential that is very difficult to quantify and which may eventually lead to a reduction well below a stabilization. However, given the fact that most emission reduction measures require a considerable time before they have reached a widespread implementation and can provide a reduction effect that aims for more than a stabilization, it is therefore essential that an optimum timetable needs to be established ensuring a speedy implementation of the identified measures without unnecessary delay. This is in agreement with the recommendations put forward by the Austrian $CO_2$ Commission.

## VULNERABILITY ASSESSMENT OF CLIMATE CHANGE AND ADAPTION MEASURES FOR AUSTRIA

29. Europe's mountains are particularly vulnerable to climate change. The intricate topography of mountain environments complicates weather patterns, making it difficult to project the specific impact of climate change in these regions. Nevertheless, it is clear that climate change will add to the current strong stresses on Europe's mountain regions, which are already threatened by pollution and population pressures.

30. For Austria it is anticipated that a doubling of atmospheric $CO_2$ relative to pre-industrial concentration levels, as to be expected during the first half of next century, will result in an increase in temperature with a maximum in winter (of about 3°C, compared to about 2°C mean annually), an increase in winter precipitation (of about 10-20 per cent), a decrease of precipitation during summer, and a decrease in the number of days with snow cover by 10-20 days per degree Celsius and year up to altitudes of 2,500 m.

31. Furthermore, it seems to be likely that a snow cover of at least one month will occur only from 500 m on, if temperature will increase by 2°C at all altitudes. All Austrian glaciers would diminish, many of them disappearing completely. Winter snowfall would decrease in favour of rain, thus increasing run-off. By way of contrast, potential summer evaporation would be higher, thus decreasing run-off.

32. Forests typically take centuries to adapt to new conditions and so would be especially hard hit. Considering the upset of sensitive stages in the life-cycle of most species, furthermore the fact that the condition of protective forests is unsatisfactory, because, inter alia, a significant part of its rejuvenescence is destroyed by deer and therefore prevented, and in addition air pollution and other stress factors such as the encouragement of detrimental insects and biological pathogens, the increase of forest fires and the occurrence of severe storms and the warming as such, it is anticipated that the overall result of climate

change -- dependent on the ecological amplitude of tree species and on adaptation measures in forestry -- could lead to a change of composition of tree species and to a partial deforestation in the mountains of southern and central Europe. In already dry regions of Austria forest steppe may expand.

33. Shallow lakes and the more running waters will experience serious impacts in that the biodiversity will change -- cold stenotherm species, for example, may be strongly decimated or even eliminated -- and the biomass of specific organisms will increase. A decoupling of food chains is to be expected. During the warmer seasons of the year an increase in precipitation of calcium due to increased photosynthesis may devastate lakesides of lakes that are already rich in calcium.

34. Mountain economies may be undermined. A 1° C rise in average temperatures combined with winter drought may reduce the duration of Alpine snow cover at 1,500 m altitude by 40 per cent, with enormous consequences for tourism and the skiing industry. Drier weather conditions would also lead to a deterioration of energy and water supplies, navigation, and health conditions.

35. Except for measures aiming at afforestation and changing forest management, Austria has not yet elaborated a detailed programme of adaption measures.

36. Figure 1.1 on page 6 of the communication shows the development of Austria's pyrogenic $CO_2$ emissions on the basis of the total energy use. Process related $CO_2$ emissions are not taken into account.

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